Poster #72

Carbon Cycle Dynamics within Oregon's Urban-Suburban-Forested-Agricultural Landscapes: Impacts of Bioenergy from Additional Forest Harvest and Conversion of Non-Food Crops to Poplar

Beverly Law[1], Tara Hudiburg[2], Logan Berner[1], Andres Schmidt[1], Chad Hanson[1], and Whitney Moore[1]

[1] Oregon State University
[2] University of Idaho

Contact: Beverly Law [bev.law@oregonstate.edu]

Land management strategies within urban-suburban, agricultural, and forested landscapes can have significant impacts on local and regional carbon and water cycles thereby contributing or mitigating effects of global climate change. Decision makers' plans for bioenergy production have long-term implications, though lack fundamental understanding of impacts on ecosystems and atmospheric greenhouse gases. We quantify the interactions and feedbacks between proposed actions, ecosystem processes, and changes in climate on local and regional scales. This is particularly important as strategies for limiting CO_2 emissions are often implemented by states.

We assess the combined effects of changes in land-use and land cover (LULC) and climate on the carbon cycle over Oregon, which has a strong population-vegetation-climate gradient. To meet GHG reduction targets, Oregon's last coal power facility was converted to burn forest harvest residues for bioenergy. Our assessment of availability of forest harvest residues shows the supply is neither sufficient nor sustainable. Forest harvest residues combined with forest thinning where fire return intervals are short produce less than half of the energy supply for the first harvest cycle, and the supply from thinning is reduced in subsequent years. Conversion of Willamette Valley non-forage grass-seed cropland to poplar could nearly supplement the remainder needed annually, but this would require fertilization and irrigation. Furthermore, the land-use change from grass crop to poplar is an unfavorable option to landowners because grass seed is a traditional cash crop. Thus, initial estimates show that burning harvest residue and thinned trees in dry areas vulnerable to fire in Oregon would not appear to provide a sustainable supply for even half of the energy needed annually and would fall short of demand within the first 25 years. Importantly, the net effect is a decrease in the net ecosystem carbon balance of Oregon's forest sector.